

the nearest natural allies of both the mimickers and mimicked are *not* always to be found in the same district. This deserves the more attention, since it appeared so strong to Mr. Bates as to lead him to relinquish the idea of hybridisation as an explanation after it had crossed his mind. "The explanation," says he, "that the whole are the result of hybridisation from a few originally distinct species cannot at all apply in this case, because the distinct forms, whose intercrossing would be required to produce the hybrids, are confined to districts situated many hundred miles apart."

Before I proceed to show how simple the explanation of the absence of one of the parents is, I must beg to note in passing the admission that there are distinct forms whose intercrossing would produce the hybrids. That granted, I would remind the reader of what Mr. Bates has obviously overlooked, that we are dealing with a phenomenon probably of a very ancient date, and that one side of the parental stock may have disappeared in the course of time. I have elsewhere suggested, in regard to hybridisation as a possible originator of species, that it must be a necessary accession to such an event that the hybrids should have opportunity of isolation, such as might be obtained by thinly peopled districts where they might settle, spread, and establish themselves. Now, certainly, the Valley of the Amazons, the Malayan Archipelago, and many parts of the South of Africa (lands whence these mimetic analogies come) have at different periods all been at one time unoccupied land; for all of them have been raised from the bottom of the sea, and been peopled by the influx of the inhabitants of neighbouring lands. No one knows better than Mr. Bates that at one time Brazil was unconnected with New Granada or the Andes. The Danaids were then inhabitants of it, but not inhabitants of the countries about it; while the Pieridæ, or cabbage whites, were what I have elsewhere denominated a microtypal tribe from more temperate climes, and were present in the Andes and the mountain countries, as Columbia, connected with them. In the natural course of things, therefore, when the Valley of the Amazons was changed from the bottom of a sea to dry land, the Danaids would spread into it from Brazil, and the Pieridæ from the north and west, and meeting in an open, as yet, unpeopled country, hybridisation might take place under one of the few circumstances where I have thought it possible that it could retain its place and establish its products as species. The objection that frightened off Mr. Bates is, in reality, no objection at all to the hypothesis of the mimicry being due to hybridisation, that we are not always, or even that we should not at all be able to identify the probable parents of the mimickers as inhabitants of the same country as their supposed descendants. One of the parents we know to be present (the so-called mimicked), but there are excellent reasons why the other parent should not be present. It is of a northern type, suited for our temperate regions, but not adapted to the tropics except at a higher elevation and a cooler temperature than the damp, hot valley of the Amazons. Although, therefore, it might descend into that region, it is not only a natural but almost a necessary inference that it would not find it congenial or habitable, and although it might live long enough in it to found a dynasty of mimickers, it would soon die off from unsuitable conditions, while its hybrid offspring bred from the tropical Danaids might, from the black blood so imparted to them, find it sufficiently well suited for them.

There is yet another phenomenon connected with Mimicry, which possibly may also be connected with hybridisation, viz., the occurrence of what Mr. Wallace has called dimorphism in insects among the mimicking or mimicked species. We must not, however, confound this dimorphism with Darwin's dimorphism in plants. The two are totally different things, and, as it seems to me, have no relation or analogy to each other. In plants the dimorphism is always confined to the reproductive organs, in insects it has apparently nothing to do with them. Moreover, it seems to me that all the instances of so-called dimorphism in insects that have yet been recorded, are nothing but examples of variation, perhaps complicated by hybridisation. M. Reinhard, of Bautzen, has shown that this is the case with regard to Mr. Walsh's conclusions respecting the dimorphism of certain gall-flies, for he had found that the galls of various species appear to be so transitional between other forms, that they can only be known with certainty when the perfect insect appears. It appears to me to be also the case in all those instances where the dimorphism is confined to particular districts, as in the *Papilio Turnus* of North America, where all the females are yellow in the New England States and in New York, while

in Illinois, and farther south, they are all black, and in the intermediate region, both black and yellow females occur in varying proportions. And the case is not open to any doubt, because in the intermediate district, both yellow and black insects have been bred from the same batch of eggs. Now, if the case had been that *both males and females* equally varied, and that in the south all were black and in the north all yellow, with intermediate gradations in the districts between, we scarcely suppose that any one would have thought of calling it a case of dimorphism. If they did, then all climatal variations (and their name is legion) would come under the same category. It is only dimorphism, because the change is limited to the female. But is this a good ground? Physiologists are unanimous in holding that neither the male nor the female is the species, but both; and if that be the case, in what does a variation in the female and not in the male differ from a variation in both but in degree? Most of Mr. Wallace's instances of dimorphism are of this character—the male being the same in a number of islands in each of which the female differs. All these I regard as mere instances of climatal variation, in which the variation shows itself only in that part of the species called the female. An occasional case of variation from some other cause, as from hybridism, may possibly come to complicate this phenomenon; but it appears to me to be sufficiently explained by variation, and the circumstance above mentioned is significant that where mimicry occurs in species having dissimilar sexes, it too is often confined to the female. A. MURRAY

SCIENTIFIC SERIALS

Silliman's Journal, September 1870.—The opening article of this number is by Prof. E. Loomis, and is entitled "Comparison of the mean daily range of the Magnetic Declination, with the number of Auroras observed each year, and the extent of the black spots on the surface of the Sun." The author first discusses the observations of sun-spots, and points out some corrections that should be made in the numbers obtained by astronomers in the last century; he points out that the period is one of ten years, and is influenced by the heliocentric conjunctions of Jupiter and Saturn, but affected by the conjunctions of the Earth and Venus. By a series of tables and curves the coincidences of periods of the maximum number of sun-spots with the maxima of magnetic disturbance and auroral display are elucidated, from which it appears that the present year is a period of maximum.—In a letter to the editors, Mr. J. W. French proposes a *new period in chronology called the Precession Period*, of 25,782 years, being the time for the precession of the equinoxes. The author prefers this period, since it is founded solely on astronomical facts.—The third article is by F. W. Clarke, "On the atomic volumes of solid compounds," in which are discussed the relations of the volumes of analogous and similarly constituted bodies.—The next article, "Considerations on the apparent inequalities of long periods in the mean motion of the Moon," is by Simon Newcomb, and, after a long discussion on the observations on this subject, and the theories proposed to explain them, the author attributes the phenomenon to an irregularity in the rotation of the crust of the earth, caused by the motion of its fluid contents.—The following is a very interesting article by Dr. A. M. Mayer on "Researches in Electro-magnetism." The author has devised a very accurate method of determining the relative values of electro-magnets to replace the one usually employed, which consists of measuring the deflection of a magnetic needle which is produced by the action of the electro-magnet. The author found that this process was liable to error in consequence of the difficulty of keeping the current absolutely constant, resulting in a continual motion of the needle. These difficulties were obviated in the following manner: A line eight feet long and divided into fractions of inches was drawn on a table, the latter being so placed that the line was at right angles to the magnetic meridian; a compass, with a needle nearly six inches long, was placed on this line, and a helix was fixed at each extremity of the line. These helices were traversed by the same current, a tangent galvanometer being placed in the circuit. In this way the needle was influenced by two magnets acting in opposite directions and excited by the same current, and if any deflection of the needle was observed, it must have been due to a difference of power of the magnets. If this occurred the needle might be brought to 0° by moving it from the stronger magnet. A series of experiments was made

to determine the variation of the intensity of the force with a change of distance, by placing the needle opposite an electro-magnet and noting the deflection produced when the instruments were at different distances from one another: it was found that in the apparatus employed the intensity varied inversely as the 2.7404 power of the distance from the core. Dr. Mayer has determined the power of cores made of insulated and of non-insulated soft iron wires, and finds that the insulated core is slightly the weaker. He has also measured what thickness of tube is equal to a solid core of the same diameter, and has found that a solid cylinder ten inches long and 1.68 in diameter may be replaced by a tube of the same length and of a thickness of $\frac{1}{8}$ of the diameter. This relative size does not appear to be constant for cores of all dimensions. A longitudinal slit in the tube does not diminish its power; in fact, Dr. Mayer seems inclined to think that it facilitates its magnetisation. By placing a helix inside a soft iron tube a magnet is produced with poles the reverse of those of the coil, or of a bar placed within the helix; this supports Ampère's theory of magnetic currents. Numerous other experiments are detailed in this paper, and the author promises to employ his apparatus for the determination of the force of magnets of different sizes.—Mr. G. F. Barker contributes an abstract of the second series of Professor Meissner's researches on electrified oxygen, in which are detailed the author's experiments on the substance formed simultaneously with ozone which possesses the property of producing a white mist in contact with water. The original paper was published by the Göttingen Royal Society of Sciences.—Mr. A. E. Verrill describes a new species of Entozoön from the Hog. This is followed by some notes on the structure of the Crinoidea, Cystidea, and Blastoida, by E. Billings, F.G.S.—The next article consists of contributions to chemistry from the laboratory of the Lawrence Scientific School, the first paper of which is by W. G. Leison, on the precipitation and determination of the metals of the magnesium group in the form of oxalates. For this purpose the solutions containing the metals are mixed with oxalic acid and alcohol, the precipitated oxalates washed, dried, and dissolved in hydrochloric or sulphuric acid, and the quantity of oxalic acid present estimated by means of a standard solution of potassic permanganate. A number of examples show the accuracy of the process.—J. H. Talbott describes the precipitation of zinc and manganese as sulphides, and the quantitative separation of tin and tungsten by fusing with potassic cyanide, by which the tin is reduced to the metallic state.—A new mode of treating gelatinous precipitates is suggested by T. M. Chatard, which consists in evaporating the liquid containing the precipitate to dryness, and stirring until the mass becomes a dry powder, which is then readily washed on a filter.—S. P. Sharples points out that antimonious sulphide precipitated by sulphuretted hydrogen in boiling solutions is granular and easily washed. Arsenious sulphide does not behave in a similar manner.—In the fifth section B. Godwin advises the repetition of quantitative analyses with the same quantity of material, the mean of the results being taken.—The next article is by Professor W. A. Morton on the corona seen in total eclipses. He calls the attention of astronomers to the importance of determining the positions of the more prominent portions of the corona with reference to the equator of the sun.—Dr. Finlay contributes observations on prehistoric archæology in Greece.—The remainder of the journal consists of extracts from other journals principally European.

THE *Geological Magazine* for December (No. 78) opens with a curious paper on Earthquakes, written about the year 1798 by Sir John Prestwich, an ancestor of the President of the Geological Society. This paper is interesting not only as showing the absurdities which passed as science not much more than seventy years ago, but also as giving a list, derived from old historical works, of the occurrence of earthquakes in England.—The most important article in the number is a continuation of Mr. H. Woodward's Contributions to the Knowledge of British Fossil Crustacea, containing descriptions of species of the curious genus *Cyclus* from the British Carboniferous rocks. Many of the species are described as new, and most of them are well figured. There is also an interesting article by Mr. George Maw, on Recent Changes of Level in the Coastline of the Mediterranean; and Mr. J. F. Walker describes and figures some *Brachiopoda*, from the Lower Greensand of Upware in Cambridgeshire, two of them as new species. Other papers are: "On the Age and Position of the Blue Clay in the West of England," by Miss C. Eyton; and "On the Dispersion of Granite Blocks over the Plain of Cumberland," by Mr. D. Mackintosh.

THE most important paper in the *American Naturalist* for November is one presented by Prof. Agassiz to the Troy meeting of the American Association for the Advancement of Science, "On the former existence of local glaciers in the White Mountains." He conclusively shows that whatever may have been the number of its higher peaks which at any given time during the glacial period rose above the great ice-sheets that then covered the country, this mountain range offered no obstacle to the southward movement and progress of the northern ice-fields. To the north of the White Mountains, as well as to the south, the northern drift consists of a paste more or less clayey or sandy, containing abraded fragments of a great variety of rocks, so impacted into the minutely comminuted materials as to indicate neither stratification, arrangement, nor sorting, determined by the form, size, or weight of these fragments. Large boulders and pebbles of all sizes are found in it throughout its thickness, and these coarser materials have evidently been ground together with the clay and sand under great pressure, beneath heavy masses of ice; for they have all the characteristic marks so unmistakable now to those who are familiar with glacial action, scratches, grooves, furrows, &c. We have also articles "On the Habits and Migrations of some of the Marine Fishes of Massachusetts," by J. H. Blake; "What is the Washington Eagle?" and "On the Distribution of the Moose in New England," by J. A. Allen; "Notes on certain Inland Birds of New Jersey," by Dr. C. C. Abbott; and two reprints, "On the Cultivation of Alpine Flowers," and "Acclimatisation of Foreign Trees," both from the *Quarterly Journal of Science*, by Mr. A. W. Bennett. Further abstracts are also given of papers read at the recent meeting of the American Association for the Advancement of Science.

SOCIETIES AND ACADEMIES

LONDON

Royal Geographical Society, December 13.—Sir H. Bartle Frere, vice-president, in the chair. The following new fellows were elected:—Daniel David Dymes; Colonel T. G. Glover, R.E.; R. M. Gordon; Captain L. W. Longstaff, Edward Masterman, jun.; Don Pompeo Moneta (Chief Engineer Argentine Republic), Charles Pannel; Alfred Robinson; G. S. T. Scobell; and C. A. Winchester.—Lieutenant G. C. Musters, R.N., read a paper on his recent journey through Patagonia, from the Straits of Magellan to the frontier of the Argentine Republic. The author, having determined on this journey, landed at the Chilean penal settlement of Punta Arena, in the Straits, on the 15th April, 1869, and, having procured the goodwill of the governor, was permitted to accompany a party who were despatched across the country to recover some runaway convicts at the mouth of the River Santa Cruz. Here he made a friendly arrangement with Orkeke, the cacique of a tribe of Patagonians, to traverse the country with them as far as the Rio Negro. He studied their language and manners, and joined them in their hunting parties: the country abounding in game, chiefly guanaco, the three-toed ostrich, and the puma, or American lion, the latter of which was eaten as well as the rest. Frozen rivers and heavy snow-falls prevented their starting from Santa Cruz before the 12th of August. They travelled at first in a westerly direction, until reaching the foot of the Cordilleras, along which they marched for upwards of 700 miles to the upper waters of the Rio Negro, making a short, but important, detour across the River Limay, in the Cordillera due east of Valdivia. The author described the streams crossed throughout the route, the physical nature of the country, and its chief productions, and gave also long and most interesting details of the manners of the wild tribes, including an account of hostile encounters with other tribes. He stated that, when not excited, the Patagonians manifested a good-tempered and generous disposition, and that they were remarkable for their affection to their wives and children. The women have the whole charge of the tents, constructed of poles and guanaco skins, and the march of many months was an almost continuous chase after the game of the country. Every morning the chief gave his orders for the day in a set speech. The men, on starting, spread themselves over a wide space in the plains, in a crescent form, the more advanced of whom on each side, travelling fastest, as the whole cavalcade moves on, meet in front, and thus enclose the game in a circle; the women and children, with the baggage-horses, forming the base line of the crescent. In the earlier part of the journey four such marches were made in succession, averaging